SEAlevel™ SYSTEM FOR MONITORING FLUID LEVELS IN WASTE TANKS

TECHNOLOGY DESCRIPTION

The SEAlevel™ Monitoring System consists of a deployment system and a sensor and electronics package for determining the profile of weight-percent suspended solids as a function of depth into tank wastes. The system will be used to monitor the changing vertical total suspended solids (TSS) profile to allow accurate positioning of a suction nozzle for supernatant removal. The deployment system will effectively isolate the wetted components of the measurement system from the operator and the environment outside of the tank, while providing a means of introducing standard solids suspensions to be used for periodic calibration of the system.

The measurement approach will incorporate off-the-shelf detection technologies into a custom housing and deployment system. Optical TSS measurement approaches will be explored for commercially available instruments that are highly accurate below a few weight-percent TSS. Customization of the instruments will be necessary for producing a field-ready system capable of surviving the harsh environment of radioactive waste tanks.

TECHNOLOGY NEED

The purpose of this research effort is to develop, test, and deploy a prototype sensor for monitoring suspended solids in U.S. Department of Energy (DOE) high-level radioactive waste tanks. The specific target application is to monitor the vertical profile of suspended solids concentration in waste processing tanks at the Savannah River Site (SRS) Extended Sludge Processing (ESP) facility. The primary design goal of the measurement system is to quantitatively determine the waste stratification layer where the TSS level is below 0.1 percent by weight.

This measurement capability is needed to allow operators to determine when and where the supernatant has reached the 0.1 weight-percent suspended solids concentration level. This information will be used to guide the process of decanting liquid from the tanks. The specific technology need statements that address this issue are:

- SR-2031 - Develop Techniques to Increase Defense Waste Processing Facility (DWPF) Throughput and Productivity
- SR-2044 - *In Situ* Methods for Characterization of Tank Waste
- SR99-2044 - Demonstrate *In Situ* Characterization Weight Percent Probe

Other site technology needs statements that are applicable include:

- OH-F0007 - Feed Slurry Rheology/Hydraulic Study
- RL-WT020 - Service Integrity Testing of High-Level Waste Tanks and Piping
- RL-WT026 - Tank Leak Detection Systems for Underground Single-Shell Waste Storage Tanks

TECHNOLOGY BENEFITS

The baseline alternative to the technology being developed is to simply wait a conservative amount of time so that suspended solids can sufficiently settle before the supernatant is decanted. It is believed that sufficient settling occurs in approximately one week. However, because no suspended solids measuring techniques are available, a 40-day settling period is used to ensure that the weight-percent of suspended solids is below 0.1 percent. Another baseline alternative that is used is to lower a single-use sensor into the tank waste that provides only qualitative information on the TSS profile. With an accurate measure of the suspended solids concentration profile provided by the SEAlevel™ system, waste processing operators at SRS will be able to make better informed decisions as to when and at what level to begin the decant process.

Extended Sludge Processing requires six to seven sludge washing cycles for every macro batch of sludge feed for DWPF. Each of these cycles requires a 40-day wait time to ensure that the sludge has settled before beginning decant. This amounts to 280 days in total wait time to process a macro batch of sludge for DWPF feed. This wait time is on the critical path for preparing feed for the next and subsequent sludge batches. The wait time for the third macro batch of DWPF sludge feed could impact operation of DWPF. In the event that a macro batch of sludge could not be prepared in time, the unrecovered lost production at DWPF would cost about one-million dollars per day.

COLLABORATION/TECHNOLOGY TRANSFER

Science and Engineering Associates, Inc., (SEA) has developed multiple environmental technologies that have been incorporated into an environmental services business sector of the company. SEA has commercial sales of products and services at multiple national laboratories and commercial sites. Upon successful completion of the development and implementation of the SEAlevel™ system, the technology will be incorporated into SEA's commercial services business.

ACCOMPLISHMENTS AND ONGOING WORK

The technical specifications required of the monitoring system for applications at SRS have been established through meetings at the site. The system detection levels and performance specifications were established along with the ambient conditions in which the sensor will have to operate. Radiation survivability tests were conducted on candidate TSS sensors. The preliminary design of the system has been established and reviewed by SRS.

TECHNICAL TASK PLAN (TTP) INFORMATION

TTP No./Title: FT06C261 - SEAlevel^{TM} Monitoring System for Waste Processing Tanks

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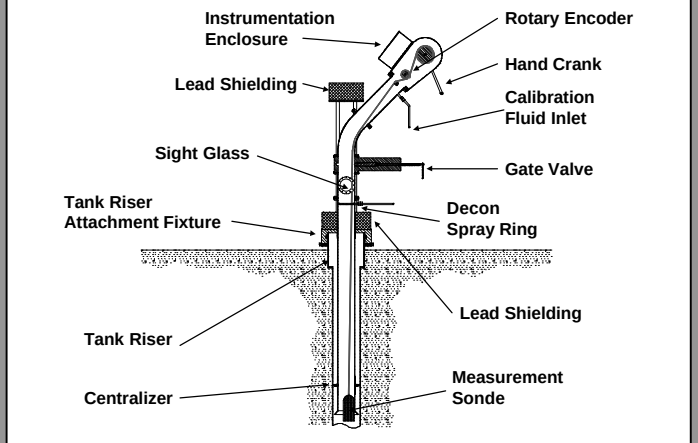

Conceptual Design of Automated High-Level Waste Tank Fluid-Level and Density Monitoring System